REMARKS/ARGUMENTS

Claims 22-26 and 29-30 remain in this application. Claims 1-21 and 27-28 have been withdrawn without prejudice as directed to a non-elected invention.

Claims 22, 23 and 29 have been amended in order to more particularly define the invention. Basis for these amendments is found at page 9, lines 17-22, page 10, lines 26-32, page 12, line 1, and page 12, line 30 to page 13, line 2 of the application as filed. Reconsideration of this application in light of the foregoing amendments, following remarks, and appended Declaration of Thorsten R. Boger under 37 CFR §1.137 is respectfully requested.

Claims 23 and 29-30 stand rejected as indefinite under 35 U.S.C. §112, second paragraph. In response to that rejection claim 23 has been amended to clarify the reference to the initiation of internal agitation in claim 22, and claims 29-30 have been amended to add a term suggested by the Examiner.

The Examiner indicated a need for clarification as to the basis for the limitations of claim 29, lines 13-15; the features of the invention to which those limitations are drawn are disclosed at page 9, lines 17-22, page 10, lines 26-32, and page 12, line 30 of the specification. In view of these amendments, reconsideration and withdrawal of the rejection of claims 23 and 29-30 under 35 U.S.C. §112 are respectfully requested.

Claims 22-24, 26 and 29-30 stand rejected under 35 U.S.C. §103 as unpatentable over Ohta, U.S. Patent No 6,086,832, taken with Lange et al., U.S. Patent No. 6,087,455. Ohta was cited to show the recirculation of a flow of reactant past a catalyst in a tank reactor, but clearly omitted any suggestion to utilize a honeycomb catalyst. Lange was cited to show the use of a honeycomb catalyst to produce a chemical product.

In the Examiner's view, modifying Ohta by substituting a honeycomb-shaped catalyst as in Lange for the pelletized catalyst of Ohta would have been an obvious matter of design choice. The rule applied by the Examiner was that shape changes are generally considered to be within the level of ordinary skill in the art, absent any showing of unexpected results.

Reconsideration and withdrawal of this rejection are respectfully requested. As is established by the appended Declaration of Dr. Thorsten Boger, unexpected results do in fact result from the present invention. Withdrawal is also appropriate because the invention provides a solution to a long-felt need, a need that others in the art have so far failed to provide. Further, there is clearly no positive suggestion or other basis in the cited prior art

that would motivate a skilled artisan to combine the references in the manner relied on in support of the rejection.

Regarding unexpected results, the appended Declaration of Dr. Boger demonstrates that, unlike the catalyst testing apparatus of Ohta, low resistance to fluid flow of the catalyst bed is an essential feature for the efficient operation of an industrial loop reactor. For this reason the use of honeycomb monoliths, rather than pellet beds or monolithic foam catalysts, is a critical requirement for practical utility in accordance with the claimed invention. (Paragraphs 7 and 8 of the Declaration).

Dr. Boger's conclusion is supported by data confirming the differences in flow resistance between foam or pelletized (ring, sphere) catalyst beds and honeycomb catalyst beds over a wide range of void fractions. Honeycomb catalysts demonstrate gas or liquid flow resistances more than an order of magnitude less than those of random (pellet) packings, and several times less than even high-void-fraction foam catalyst beds (Paragraphs, 11, 13 and 15). Even for gas/liquid mixtures, catalyst bed pressure drops are at least three and up to as many as 14 times higher for pellet beds than for honeycomb beds. (Table 2 and Paragraph 17 of the Declaration).

The significance of these differences, as explained by Dr. Boger, is that there is a maximum practical limit on catalyst bed pressure drop that can be tolerated in internal loop reactors utilizing mechanical (stirrer), gas bubble or liquid jet means for liquid recirculation within the reactor. Above that limit, which corresponds to a bed pressure drop of about 500 Pascals per meter of bed depth, fluid will circulate through the by-pass passageway instead of the catalyst bed, and the activity of the catalyst and the energy for driving the reactor will be largely wasted (Paragraph 18).

Given this practical limit on bed pressure drop, and the well known fact that pressure drop depends directly on fluid flow velocity through the bed, reactor efficiencies can be effectively compared on the basis of the maximum fluid velocities (fluid recirculation rates) that can be sustained through a catalyst bed in an internal loop reactor before by-pass of the catalyst bed becomes significant. (Paragraph 19). When the relevant pressure drop data for pellet and honeycomb catalyst beds are examined and compared on this basis, it is found that the liquid recirculation rates attainable through honeycomb monolith catalyst beds operating below the pressure drop limit are 24-28 times higher than those achievable with pelletized

catalyst beds of substantially the same geometric surface area. (Paragraphs 20-21 and Table 3 of the Declaration).

Clearly this unexpected advantage is a difference in kind, rather than in degree. It is an advantage that is not even remotely suggested by the cited prior art, yet that has a critical impact on reactor performance. In fact, Dr. Boger's opinion is that this difference is the main reason why large pellet bed loop reactors are not used on an industrial scale today. Certainly, as a person well qualified by education and experience to address the technical aspects of the invention, Dr. Boger's opinion on these matters ought to be given great weight in this case.

In summary, catalyst shape is in fact critical to the operability of the present invention, providing clearly unanticipated advantages when selected as the Applicant requires. Neither Ohta nor Lange presents teachings or suggestions from which these results could have been predicted, and accordingly, the patentability of claims over those references is clearly established.

Yet another consideration supporting the patentability of the present invention over the cited prior art is the failure of others to recognize the Applicant's solution to a long-standing problem in the art. One specific example of a long-standing problem with stirred tank reactors is that of separating the catalysts from liquid reactants or products in the event of a runaway reaction. (page 14, lines 19-27 of the specification). U.S. Patent No. 4,883,847 to Leung et al. (1989) demonstrates the longstanding nature of this problem.

Even earlier is U.S. Patent No. 3,885,977 to Lachman et al. (1973), which establishes that honeycomb catalysts for the treatment of fluid streams have long been known. While the Examiner's view is that it would have been obvious to use the honeycomb catalyst of Lange in the method of Ohta, it is apparent from the older Leung and Lachman references that at least one problem with tank reactors (Leung), and a catalyst of a different shape that in the Examiner's view constituted an obvious solution to the problem (Lachman), had been known for nearly 15 years prior to the making of the present invention. Yet during that entire time the use of a honeycomb catalyst to solve this clearly identified reactor problem was not recognized. This fact alone must raise a substantial question concerning the postulated obviousness of the catalyst substitution. More than that, it compels the conclusion that the substitution of a honeycomb catalyst into a tank reactor such as that of Ohta was not an obvious expedient, since there was a need for such a substitution that was not appreciated prior to the Applicant's conception of the present invention. Accordingly, for this reason

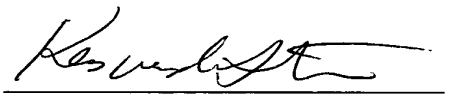
also, reconsideration and withdrawal of the rejection of claims 22-26 and 29-30 on reference to Ohta and Lange are called for in this case.

Finally, the rejection of claims on reference to Ohta and Lange appears not to have been based on any positive suggestion in the references to combine the diverse teachings in the manner now proposed. It may be that the Examiner in this case was inadvertently led to the conclusion of obviousness in light of the Applicant's own disclosure teaching the use of a honeycomb catalyst in the process and apparatus now claimed. However, to the extent that the present obviousness rejection may in fact have been based on such a hindsight reconstruction of the invention, rather than on any reference teachings constituting a positive suggestion to combine references that offered a reasonable expectation of successful results, then reconsideration and withdrawal of that rejection would now be appropriate.

For all of the foregoing reasons, the Applicants respectfully submit that remaining claims 22-26 and 29-30 of this application are both patentable over the prior art of record herein, and otherwise now in condition for allowance. Accordingly favorable reconsideration of this application and allowance of those remaining claims are courteously solicited.

The Applicant believes that only a one-month extension of time, to and including October 2, 2003, is necessary to make this Reply timely, and accordingly request that the Office grant such time extension pursuant to 37 C.F.R. § 1.136(a). Contingently, the Applicant further requests such additional time extension as may be necessary to make this Reply timely, if in fact such additional extension is required. The Office is hereby authorized to charge any extension fees or surcharges required in this case to the deposit account of Corning Incorporated, Deposit Account 03-3325.

Respectfully submitted,



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KvdS/cw
Attachment: Declaration of Dr. Thorsten Boger